SPIXIANA	16	2	157–167	München, 1. Juli 1993	ISSN 0341–8391

The larvae of *Anilara antiqua* Thèry and *Anilara nigrita* Kerremans

(Insecta, Coleoptera, Buprestidae)

By **M. G. Volkovitsh** and **T. J. Hawkeswood** *

Volkovitsh, M. G. & T. J. Hawkeswood (1993): The larvae of *Anilara antiqua* Thèry and *Anilara nigrita* Kerremans (Insecta, Coleoptera, Buprestidae). - Spixiana **16/2**: 157-167

The larvae of *Anilara antiqua* Thèry and *A. nigrita* Kerremans are described from material collected during July 1988 from the Toowoomba district, south-eastern Queensland, Australia. The two larvae are compared with each other and comparisons are also made with the described larvae of the Australian genera *Neocuris* (subfamily Buprestinae) and *Diadoxus* (subfamily Chalcophorinae) and the New Zealand genus *Maoraxia* (subfamily Buprestinae). The *Anilara* species are finally compared with genera of the extra-Australian tribes Kisanthobiini, Anthaxiini and Melanophilini (subfamily Buprestinae).

M. G. Volkovitsh, Zoological Institute, Academy of Sciences of the USSR, 199034, Leningrad, USSR.

T. J. Hawkeswood, 49 Venner Road, Annerley, Brisbane, 4103, Queensland, Australia.

Introduction

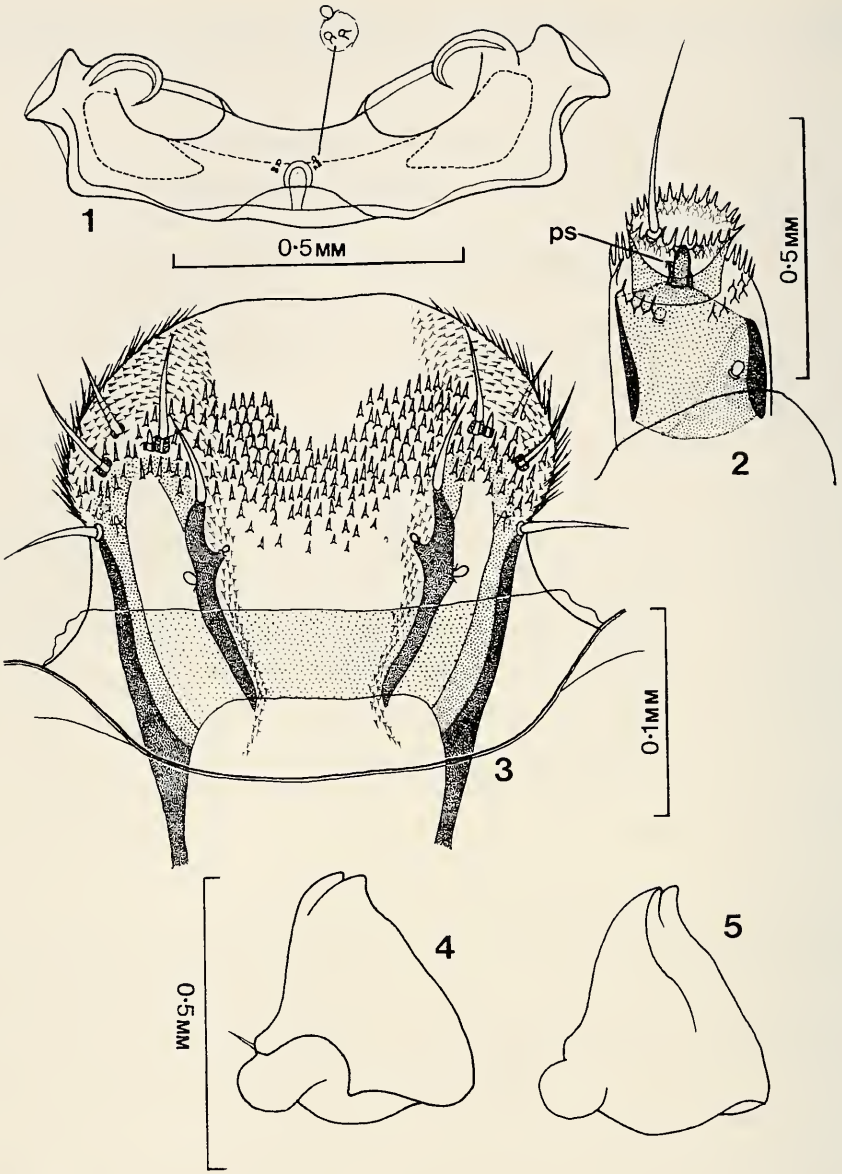
The general biology and taxonomy of the genus *Anilara* are poorly known (Hawkeswood & Peterson 1982; Hawkeswood 1988). *Anilara* is an endemic Australian genus represented by at least 15 species (Carter 1926, 1929). Hawkeswood (1988) recently recorded two *Anilara* species breeding in the wood of the rainforest tree *Flindersia xanthoxyla* (A. Cunn. ex Hook.) Domin (Flindersiaceae), but the biology, larvae and host plants of most *Anilara* species remain unknown. Recent field work by one of us (T. J. H.) has resulted in the acquisition of larval and adult material of two sympatric species of *Anilara* from dead, fallen branches of *Eucalyptus crebra* F. Muell. (Myrtaceae) in the Toowoomba district, south-eastern Queensland. On the basis of this material, the larva and general biology of both species are described below. The terminology used for the larval descriptions generally follows that of Volkovitsh & Hawkeswood (1987, 1990) and the larval papers cited therein. The adults have been keyed using Carter (1926) but due to the fact that there are no modern revisions of the genus *Anilara*, the identifications may be tentative at this stage.

Larval descriptions

Anilara antiqua Thèry
(Figs 1-14, 17)

Length of the last instar larva 10.8-13.5 mm; width of the prothorax 2.8-3.2 mm; width of the abdomen 1.0-1.5 mm. Larva is of the usual buprestid type with an enlarged prothorax into which the

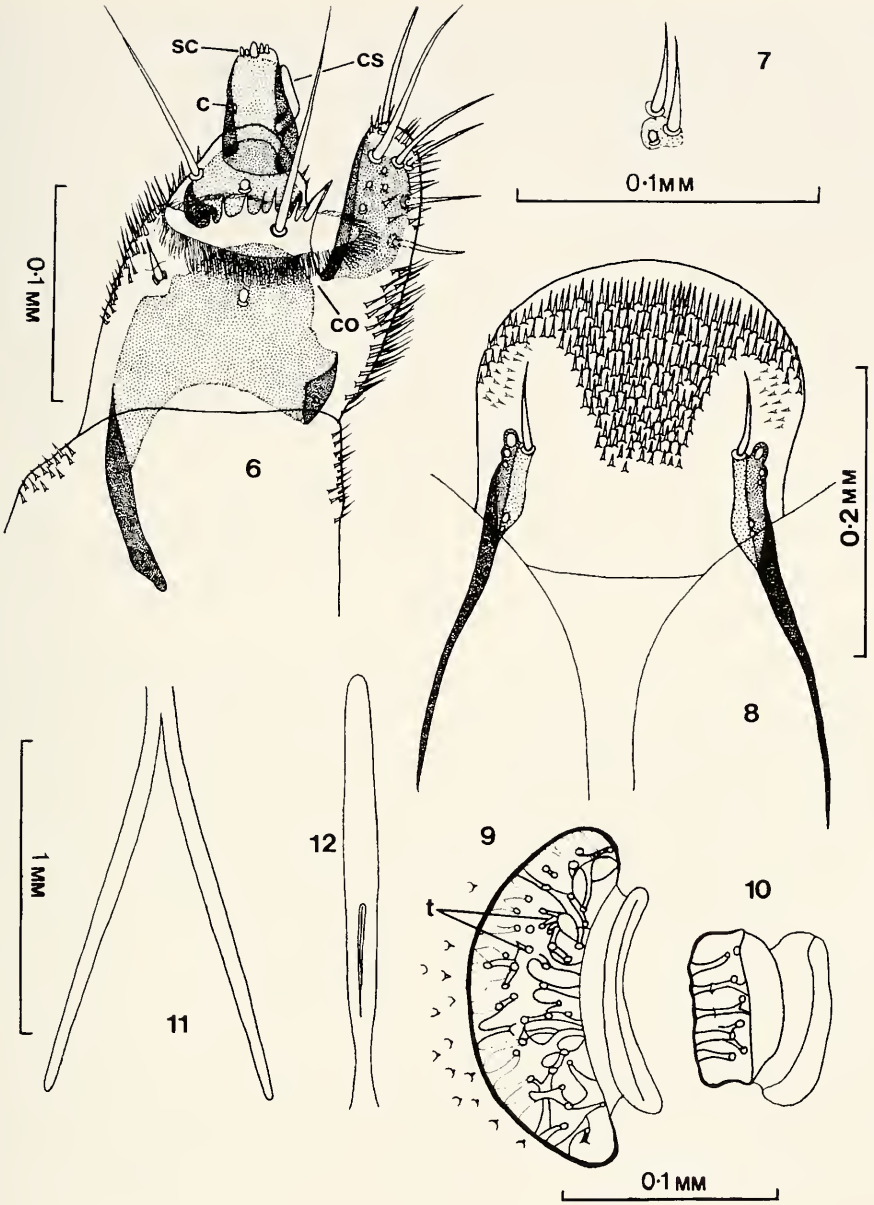
* Reprint requests to T. J. Hawkeswood.



Figs 1-5. *Anilara antiqua* Thèry. 1. Epistome and epistomal pits. 2. Antenna showing armature and palmate sensilla (ps). 3. Labrum. 4. Left mandible, dorsal view. 5. Right mandible, ventral view.

head capsule is retracted; this larva corresponds to the 1st morpho-ecological type of *Acmaeoderella* larva (Volkovitsh, 1979). Body whitish to cream, apodous, very weakly sclerotized except for mandibles, epistome, hypostome and spiracles.

Head and mouthparts. Epistome (Fig. 1) narrow, about 5.2 times wider than long; anterior margin moderately bisinuate between the mandibular condyles which are large; posterior margin sinuate between the lateral tentorial pits; epistome with blunt, broadly rounded lateral margins and bearing two groups of 3 epistomal sensillae situated in very shallow, poorly defined pits in the middle. Clypeus narrow, membranous, glabrous, dark cream in colour, about 2.8 times wider than long, collar-shaped, anterior margin straight. Labrum (Fig. 3) weakly transverse, about 1.1 times longer than wide, pale



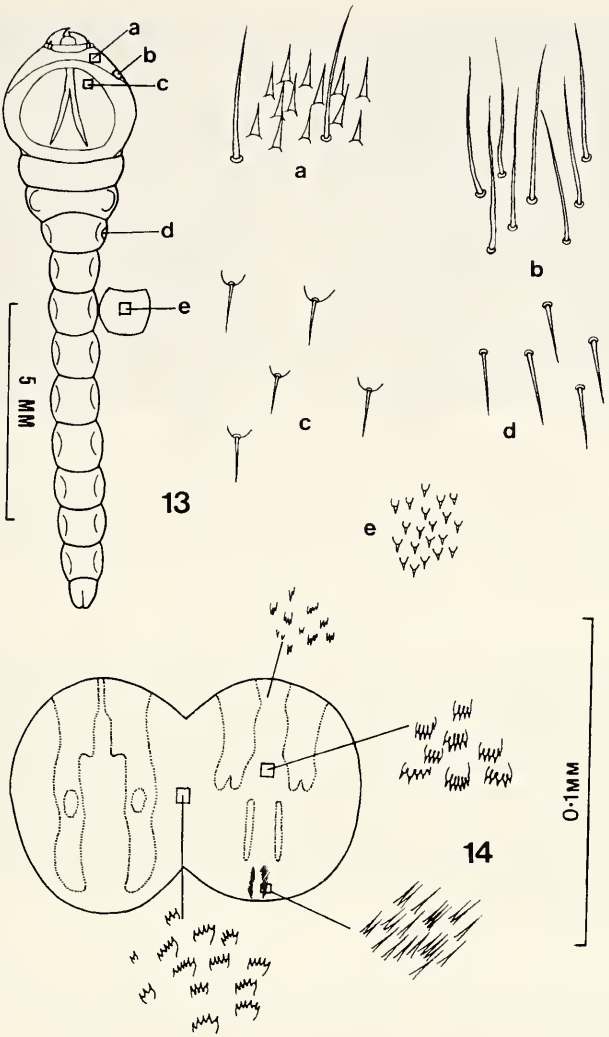
Figs 6-12. *Anilara antiqua* Thèry. 6. Left maxilla showing anterior part of cardo, stipes, maxillary palpus, bristles, microspinulae, corolla of hairs (co) and specialized sensory structures - sensory cones (sc), curved sensilla (cs) and campaniform sensilla (c). 7. Sensilla on maxillary basis (cardo). 8. Labium. 9. Thoracic spiracle showing trabeculae (t). 10. Spiracle of first abdominal segment. 11. Pronotal groove. 12. Prosternal groove.

brown, mostly membranous but bearing very prominent palantine sclerites; anterior margin very weakly arcuate between very broadly rounded lobes. Labrum dorsally with the sclerotized palantine sclerites each bearing 3 campaniform sensillae, 4 long setae and one very short seta, arranged as follows on either side: two campaniform sensillae (one smaller than the other one) arising from the palantine sclerite about half way between the lateral margin of the labrum and the midline and the other arising near a long seta

situated about halfway along the lateral margin; 4 long setae situated on or immediately below the broad lobe of the labrum, 2 near the lateral margin and the other 2 about 1/2 the distance from the lateral margin to the midline; the short seta situated adjacent to one of the long setae. External surface of labrum also with a moderately broad zigzag transverse band of microteeth situated about 1/3 the distance from the anterior margin of the labrum to the base; lateral margin of the labrum with a dense fringe of short, sharp setae arising near the long lateral seta and extending to the anterior margin; anterior region of labrum glabrous; Labrum ventrally (epipharynx) with a sharp seta near the anterior-lateral margin of each lobe, and with a region of dense microspinulae on the sides and extending in a narrow band to the base of the labrum. Antennae (Fig. 2): 2-segmented; 1st segment broadly cylindrical, about 2.0 times longer than segment 2, strongly sclerotized, about 1.2-1.5 times longer than wide, the internal margin slightly shorter than the external, with a narrow fringe of stiff, short microspinulae on the anterior margin and a prominent campaniform sensilla on the internal margin towards the base of the segment and another one on the external margin near the apex of the segment; 2nd segment about 1.0-1.2 times longer than wide, with a fringe of short, stiff, sharp microspinulae on the anterior margin, and a very long sharp seta (trichosensilla) situated near the external lateral margin; apex of 2nd segment deeply concave, encircling a prominent, rounded, spineless sensory appendage (often regarded as a 3rd antennal segment) and 1 or 2 small, poorly developed, palmate sensillae. Mandibles (Figs 4 & 5): black, short, robust, with two semi-acute teeth at the apex, without any distinct teeth on the inner surface.

Hypostome. Strongly sclerotized in some parts; posterior margin broadly arcuate. Labiomaxillary complex (Figs 6-8): maxillary basis (cardo) (Fig. 6) membranous, glabrous, except for a fringe of short, sharp setae on the internal margin below the anterior lateral lobes and another fringe of similar setae on the external anterior-lateral margins, and with 2 short, sharp bristles and one campaniform sensilla situated on a poorly defined and weakly sclerotized sclerite (Fig. 7). Stipes (Fig. 6) with a strongly sclerotized internal sclerite bearing one campaniform sensilla almost in the centre, one very short, sharp seta near the lateral external margin above the sclerotized area and one long, sharp seta near the anterior margin below the mala; a fringe of short to longer, sharp setae is situated on the external margin to anterior margin, while a corolla of very thin hairs are arranged at the internal surface. [It is probable that this corolla structure is homologous to the "galea" of *Acmaeoderella* larvae (Volkovitsh 1979, Fig. 28) or "lacinia" of *Ptosima* larvae (Bílý 1972) and *Thryncopyge* larvae (Bílý 1986)]. Maxillary palpus (Fig. 6): 2-segmented, basal segment strongly sclerotized, about 1.2 times longer than wide, the basal segment with a long, sharp seta arising from near the anterior-lateral margin and a campaniform sensilla situated in the middle; the external margin and part of the internal margin with a few, sparse, short, sharp setae; 2nd segment about 1.4-1.5 times longer than wide, moderately sclerotized, with one modified curved sensilla internally near the internal margin and one campaniform sensilla at the external margin at the middle and about 6 small conical sensory structures at the apex. Mala (Fig. 6): weakly sclerotized, very narrow, long, about 2.0-2.1 times longer than wide, with several, small campaniform sensillae in the centre and with two very long, sharp bristles at or near the apex, and with 4 long bristles situated on the internal surface; the external surface of mala also with dense, short, sharp setae. Labium (Fig. 8): partly sclerotized, weakly transverse, with a broadly arcuate anterior margin; external surface of prementum with a dense quadrangular-shaped zone of short, sharp spines (microspinulae) in the centre in the anterior half, this zone extending into a narrow curve of microspinulae on each of the lateral lobes of the labium, reaching the level of sharp seta on corner sclerites (see below); microspinulae arising from small membranous tubercles; anterior margin glabrous; base of prementum with two corner sclerites each bearing one long, sharp seta and 5 small, campaniform sensillae at the centre of the sclerite; the sharp, anteriorly-directed setae reach about 1/3 the length of the prementum from the anterior margin; internal surface of prementum with sparse microspinulae near the lateral lobes; postmentum glabrous, without setae or microspinulae.

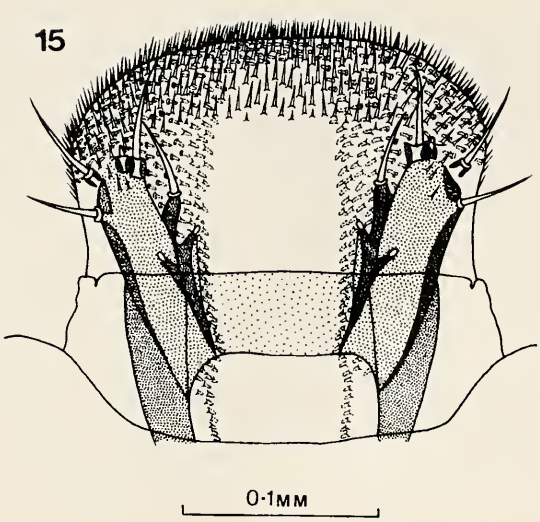
Thorax (Figs 11-13). Pronotal (Fig. 13) and prosternal plates glabrous except for some very sparse, short bristles situated on weakly developed tubercles (Fig. 13c) on the anterior sides of plates; microspinulae (Fig. 13a, e) and microampullae (as found in *Neocuris* larvae, Volkovitsh & Hawkeswood 1987: 275) are absent; anterior prothoracical membrane with microspinulae (Fig. 13a) and sparse bristles (Fig: 13b) at the anterior margin and dense, long bristles at the sides; (zones of microspinulae are mainly situated on the anterior regions of prothorax (Fig. 13a), with indistinct zones around thoracic and 1st pair of abdominal spiracles); prothoracical grooves (Figs 11 & 12) brownish in live specimens, colorless in preserved specimens; pronotal groove (Fig. 11) inverted "V"-shaped, dividing

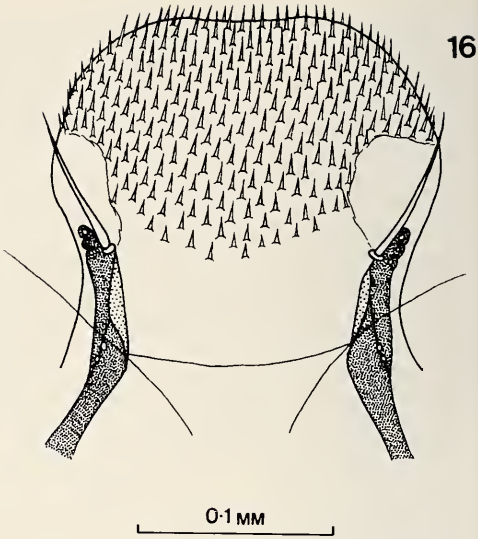


Figs 13-14. *Anilara antiqua* Thèry. 13. Dorsal view of the last instar larva. a. microspinulae on the anterior prothoracical membrane. b. long bristles on the sides of the prothorax. c. short bristles arising from weakly developed tubercles on the pronotal plates. d. shorter bristles on lateral margins of abdominal segments. e. microspinulae forming an indistinct longitudinal strip on the centre of the lower surface of the abdominal segments. 14. Section of proventriculus showing the different types of spines and their distribution.

into 2 straight branches near the apex; the angle between these branches is approx. 32°. Prosternal groove (Fig. 12) uniramous, poorly defined. Meso- and metathorax with sparse long bristles (Fig. 13b) on the lateral margins. Metathorax with a pair of indistinct, poorly developed ambulatory pads on the ventral surface; these pads without internal structures. Thorax without rudiments of legs. Thoracic spiracles (Fig. 9) moderately sclerotized, reniform, about 3.0-3.2 times longer than wide, with dense, strongly branched trabeculae; short microspinulae are situated around the outer margin of each spiracle.

Abdomen (Fig. 13). Abdominal segments pale cream in colour (often darkening in alcohol), transverse, flattened; 1st segment about 2/3 the width of the metathorax (about 2.0 times wider than long and prominently wider than the width of the other abdominal segments), without ambulatory pads; segments 2-9 of similar size, slightly narrower than the 1st segment; segment 10 (anal segment) smallest. Dorsal





Figs 15-16. *Anilara nigrita* Kerremans. 15. Labrum. 16. Labium.

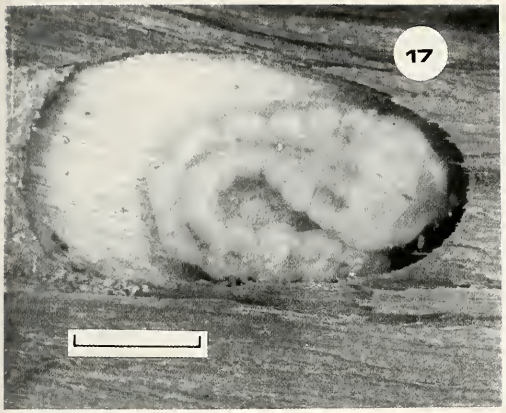
surface of abdomen mostly glabrous, lateral margins with sparse covering of bristles (Fig. 13d); ventral surface of abdominal segments with an indistinct longitudinal strip of microspinulae (Fig. 13e). Abdominal spiracles (Fig. 10) very variable, oval, circular or subrectangular in shape, without dense, weakly branched trabeculae as in the thoracic spiracles.

Proventriculus (Fig. 14). The morphology of the fields and their armature are rather simple; the armature includes bristles, scale structures and groups of microspinulae situated on the apices of finger-like tubercles.

Material examined: 3 last instar larvae, ex dead wood of *Eucalyptus crebra* F. Muell. (Myrtaceae), near Toowoomba, south-eastern Queensland, July-August 1988, collector T. J. Hawkeswood. (Specimens lodged in the collections of the Zoological Institute, Leningrad, USSR).

Table 1. Comparison of the main diagnostic characters between the larvae of *Anilara antiqua* Thèry and *A. nigrita* Kerremans

Character	*Anilara antiqua* Thèry	*Anilara nigrita* Kerremans
Size	Length of the last instar 10.8-13.5 mm	Length of the last instar 6.7-8.5 mm
Labrum	Anterior margin of labrum glabrous; zone of microspinulae forming a transverse, zig-zag shaped band between the middle and anterior quarter of external surface of labrum (Fig. 3). Microspinulae of epipharynx situated on the lateral sides only (Fig. 3)	Anterior margin of labrum with microteeth on both surfaces; zone of microteeth situated along anterior margin externally (Fig. 15). Microspinulae of epipharynx situated both on the lateral margins and along the anterior margin (Fig. 15)
Prementum	Anterior margin of prementum glabrous; zone of microspinulae not reaching the anterior margin of prementum (Fig. 8)	Anterior margin of prementum completely covered with microspinulae (Fig. 16)



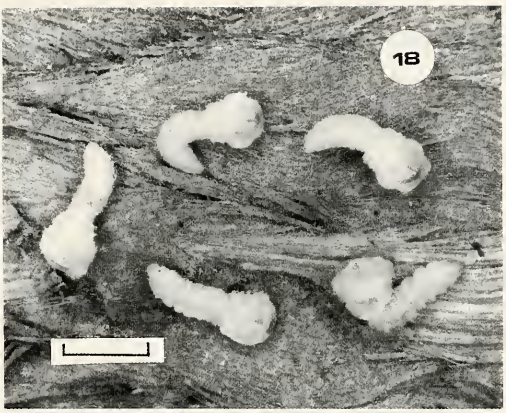


Fig. 17. Last instar larva of *Anilara antiqua* Thèry feeding on the sapwood below the bark (which has been removed for photography) of *Eucalyptus crebra* F. Muell. (Myrtaceae) near Toowoomba, Queensland, August 1988. Scale line = 3 mm. (Photo: T. J. Hawkeswood).
Fig. 18. Last instar larvae of *Anilara nigrita* Kerremans, photographed on the bark of *Eucalyptus crebra* F. Muell. (Myrtaceae) near Toowoomba, Queensland, August 1988. Scale line = 5 mm. (Photo: T. J. Hawkeswood).

Anilara nigrita Kerremans
(Figs 15, 16, 18)

Length of the last instar larva 6.7-8.5 mm; width of the prothorax 2.0-2.5 mm; width of the abdomen 1.2-1.8 mm. The larva of this species is almost identical with that of *A. antiqua* Thèry, hence a full description is not necessary and the differences between the two are outlined in Table 1.

Material examined: 15 last instar larvae, ex dead wood of *Eucalyptus crebra* F. Muell. (Myrtaceae), near Toowoomba, south-eastern Queensland, July-August 1988, collector T. J. Hawkeswood. (Specimens lodged in the collections of the Zoological Institute, Leningrad, USSR and the private collection of T. J. Hawkeswood).

Discussion

The differences between the last instar larvae of *Anilara antiqua* Thèry and *A. nigrita* Kerremans are outlined in Table 1. These differences concern body size and arrangement of the zones of microspinulae on the external surfaces of the labrum and labium (Table 1). The remaining morphological characteristics are virtually identical between the two species and further differences were not able to be ascertained. The diagnostic characteristics of the larvae of the only other fully described Australian Buprestidae (i.e. *Diadoxus erythrurus* (White) and *Neocuris gracilis* MacLeay) and the only described species from New Zealand (i.e. *Maoraxia eremita* (White)) are outlined in Table 2. (The larva of *Prospheres* from Australia is also known (Levey 1978) but this larva will be redescribed and compared in a future paper – in any case, the larva of *Prospheres aurantiopicta* (Laporte & Gory) is clearly distinguished from other known Australian buprestid larvae by the possession of a single pronotal groove). Table 2 shows that there are distinct differences between the larvae of *Anilara* and *Neocuris* (both genera are presently included in the tribe Anthaxiini, Bellamy 1985, 1986). There is complete similarity between *Anilara* and *Neocuris* on the basis of (a) the glabrous prothoracic plates and (b) the zones of microspinulae on the body surfaces; there are also prominent differences, i.e. in (a) the shape and armature of the labrum, (b) the length of the bristles at the corner sclerites of the prementum and the postmentum, and (c) presence or absence of bristles at the postmentum. The main distinguishing features of *Anilara* larvae are (a) the corolla of very thin hairs on the stipes, (b) the very narrow mala without enlarged bristles and (c) the absence of bristles on the postmentum (Table 2). The main distinguishing features of *Neocuris* larvae are (a) the shape and armature of the labrum, (b) the ridges at the apex of the mandibles, (c) the long bristles on the maxillary basis (cardo), (d) the presence of three very large sclerotized bristles on the mala, (e) the long bristle

Table 2. Comparison of the main taxonomic characters between the larvae of *Neocuris gracilis* Macleay, *Anilara* spp. (*A. antiqua* Thèry & *A. nigrita* Kerremans), *Diadoxus erythrurus* (White) and *Maoraxia eremita* (White)

Character	*Neocuris gracilis*	*Anilara* spp.	*Diadoxus erythrurus*	*Maoraxia eremita*
Labrum	Strongly transverse, with blunt setae behind anterior margin externally	Hardly subquadrate or weakly transverse, with a zig-zag band of microteeth between middle and anterior quarter or along anterior margin (Figs 3, 15)	Subquadrate with dense microspinulae along anterior margin	Subquadrate
Mandibles	With a pair of ridges at apex	With 2 rounded teeth at apex, without teeth on inner surface (Figs 4 & 5)	With 2 sharp teeth at apex, without teeth on inner surface	With 2 rounded teeth at apex, with very weak teeth (retinaculum) on inner surface
Antenna	1st segment almost equal in length to 2nd; anterior margins of both segments with sparse microspinulae	1st segment about 2.0 times longer than 2nd; anterior margins of both segments with dense microspinulae (Fig. 2)	1st segment scarcely longer than 2nd; anterior half of each segment with long, dense bristles	1st segment about 2.0 times longer than 2nd upper margins of both segments with dense microspinulae (according to Dumbleton, 1932, Fig. 20)
Maxillary basis (cardo)	With 2 long bristles arising from membrane	With 2 short bristles and one campaniform sensilla arising from indistinct sclerite (Fig. 7)	With 2 short bristles and one campaniform sensilla arising from distinct sclerite	With 2 short bristles and one campaniform sensilla arising from distinct sclerite
Stipes	Corolla of hairs on the internal surface absent	Corolla of very thin hairs present on the internal surface (Fig. 6)	Corolla of hairs on the internal surface absent	Not shown; absent??
Mala	Transverse with 3 very large sclerotized bristles	Longitudinal, very narrow; enlarged bristles absent (Fig. 6)	Same length as width; enlarged bristles absent	As for *Anilara* (according to Dumbleton, 1932, Fig. 19)
Corner sclerites of prementum	With a long bristle exceeding the anterior margin	With a short bristle exceeding the anterior third length of prementum (Figs 8, 16)	With a short bristle exceeding the anterior quarter length of prementum	With a short bristle exceeding the centre of prementum
Armature of prementum	Sharp spines forming a triangular zone, not reaching the anterior margin	Large zone of microspinulae on the anterior half; posterior border of zone forming a long, blunt projection (Figs 8,16)	Large zone of spines along the anterior margin, forming two projections at the posterior border	As for *Anilara* (according to Dumbleton, 1932, Fig. 23); anterior border of zone reaching anterior margin of prementum
Bristles of postmentum	Very long	Absent (Figs 8, 16)	Very short	Not shown; absent??
Prothoracic plates	Mainly glabrous	Mainly glabrous (Fig. 14)	Whole surface covered in microspinulae and with chitinous tubercles around grooves	Chitinous asperities present
Body surface	With small zones of microspinulae	With narrow zones of microspinulae (Fig. 14)	Whole surface covered in microspinulae	Dorsal and ventral surfaces of abdominal segments 1-9 with poorly defined sensorial areas beset with chitinous asperities

on the corner sclerites of the prementum, and (f) the very long bristles of the postmentum (Table 2). The main diagnostic features of *Diadoxus* larvae (from Hawkeswood 1985) are (a) the structure of the prothoracic plates, and (b) the microspinulae on the general body surface (Table 2). The diagnosis of the larva of *Maoraxia eremita* has been derived from the description and figures of Dumbleton (1932), although his interpretations of various structures are not identical to ours, and is presented in Table 2. Due to the incomplete and partially incorrect analysis of the *Maoraxia* larva by Dumbleton (1932) we have experienced difficulty in correctly interpreting this larva for comparative purposes. If Dumbleton's description as presented, is correct in some aspects, then the larvae of *Anilara* and *Maoraxia*, in the least, differ in (a) the structure of the prothoracic plates and (b) the type of armature of the dorsal and ventral body surfaces (Table 2).

There are important differences between the larva of *Diadoxus* and those of *Anilara* and *Neocuris*. The larva of *Diadoxus* and *Anilara* spp. differ significantly in most of the characters listed in Table 2. There is only partial similarity in the shape and armature of the labrum, mandibles, maxillary basis and armature of the prementum (Table 2). The larva of *Neocuris* and *Diadoxus* only share one feature, that being the absence of the corolla of hairs on the internal surface of the stipes (Table 2). The existence of so many significant differences in larval morphology between two genera of the same tribe (i.e. *Neocuris* and *Anilara* in the Anthaxiini) and between each of these and *Diadoxus*, does not allow us to properly clarify the taxonomic position, rank and evolutionary relationships of these taxa at the present level of knowledge of larval morphology of Australian Buprestidae.

The comparison of the larvae of *Anilara* with those of various genera of the tribes Kisanthobiini, Anthaxiini and Melanophilini from the Palaearctic, and partly Afrotropical, Regions, is provided in Table 3. In this table we have not used the characters which are very variable or constant amongst closely related taxa (e.g. the structure of the mandibles, spiracles and the armature of the proventriculus). Based on the data provided in Table 3, it can be concluded that the main diagnostic characteristics of *Anilara* are (a) the corolla of hairs on the internal surface of the stipes (found so far only in *Anilara*) and (b) postmentum externally without setae (this character also occurs rarely in some Anthaxiini, Table 3). On the other hand, the main diagnostic feature of Kisanthobiini larvae is the pronotal groove, which divides into two weakly curved branches at about half of its length (Table 3). For the Palaearctic Anthaxiini, the main diagnostic features are (a) antennae without setae or microspinulae, (b) labrum which is externally glabrous, (c) prementum, which is externally glabrous, and (d) metathorax with distinct ambulatory pads both on the dorsal and ventral surfaces which are connected by inner structures (recorded for *Cratomerus* by Volkovitsh & Hawkeswood 1987). For Melanophilini, the diagnostic characters are (a) prothoracic plates densely covered with transverse, strongly sclerotized tubercles and completely surrounded with microteeth, and (b) pronotal grooves with straight branches, close to each other but not joined (Table 3). Using a simple matching co-efficient of similarity (for the data in Table 3), the value of 0.63 is obtained between *Anilara* and Kisanthobiini, 0.28 between *Anilara* and Anthaxiini and 0.33 between *Anilara* and Melanophilini. This data suggests that, on larval morphology, *Anilara* are more closely related to the Kisanthobiini; however, on the basis of adult morphology, *Anilara* has more affinity with the Anthaxiini. The apparent similarity between *Anilara* and Kisanthobiini on larval characters is a result of similar plesiomorphic states (i.e. simplesiomorphism) which do no allow us, at the present state of knowledge, to ascertain the true phylogenetic relationships of these taxa. In addition, to add to the confusion, the larvae of Anthaxiini also show derived states for several characters. Features such as the reduction/absence of armature of the mouthparts (i.e. antennae without setae, labrum externally glabrous and prementum externally glabrous) (Table 3) of the Anthaxiini, are also found in the larvae of advanced groups, e.g. the Acmaeoderini (Volkovitsh 1979) and Agrilinae and Trachyinae (Volkovitsh & Hawkeswood 1990). Also, the complex motive structures of the metathorax of *Neocuris* (Anthaxiini) (Volkovitsh & Hawkeswood 1987) are advanced characters.

To summarize, the results of our morphological analyses of larvae of *Anilara antiqua* Thèry and *A. nigrita* Kerremans and those of several other genera of Australian and non-Australian Buprestidae are outlined in Tables 1-3. We must emphasize that the characters used in these tables are diagnostic ones. An accurate phylogenetic analysis based on these characters is made difficult on account of the absence of representative species for comparisons. This lack of knowledge makes it impossible to shed light on the relative taxonomic value for each larval character (i.e. phylogenetic weighting) and impossible to make conclusions on their evolutionary directions. Consequently, in our analyses, only the maximum/minimum level of similarity/differences between the taxa can be determined with certainty. For example, Table 3 shows that the differences between the larvae of *Anilara* and Anthaxiini

Table 3. Comparison of the main taxonomic characters between the larvae of *Anilara* spp. and those of Kisanthobiini, Anthaxiini and Melanophilini

Character	*Anilara* spp.	Kisanthobiini (*Kisanthobia*)	Anthaxiini (*Anthaxia*, *Cratomerus*) *Chalcogenia*)	Melanophilini (*Melanophila*, *Phaenops*)
Antennae	With dense micro-spinulae on the anterior margins of segments 1 and 2 (Fig. 2)	With dense microsetae on the anterior margins of segments 1 and 2	Without setae or microspinulae on the anterior margins of segments 1 and 2	With very dense microsetae on the anterior margins of segments 1 and 2
Labrum	Externally with a zone of microspinulae along the entire anterior margin or behind it (Figs 3 & 15)	Externally with dense setae along the entire anterior margin	Externally glabrous	Externally with very dense setae along the entire anterior margin
Maxillary cardo	With 2 short setae and 1 campaniform sensilla arising from indistinct sclerite (Fig. 7)	With 2 sharp setae and 1 campaniform sensilla arising from a weakly sclerotized membranous zone	With 2 sharp setae and 1 campaniform sensilla arising from a small, isolated, weakly sclerotized sclerite	With 2 sharp setae and 1 campaniform sensilla arising from a small, isolated, strong-ly sclerotized sclerite
Stipes	Corolla of very thin hairs present on the internal surface (Fig. 6)	Corolla of hairs absent from internal surface	Corolla of hairs absent from internal surface	Corolla of hairs absent from internal surface
Prementum	Externally with a large zone of micro-spinulae (Figs 8 & 16)	Externally with a dense, triangular-shaped zone of short, sharp spines	Externally glabrous	Externally with a variable-shaped zone of dense, short setae
Postmentum	Externally without setae (Figs 8 & 16)	Externally with 2 short but distinct setae	Externally with 2 very short, indistinct setae or setae absent	Externally with 2 short, indistinct setae
Prothoracic plates	Mainly glabrous with very sparse, short bristles (Fig. 13)	Glabrous except for small zones of micro-spinulae on the anterior and posterior margins and some sparse, short setae	Mainly glabrous with sparse, short bristles	Densely covered with transverse, strongly sclerotized tubercles; plates surrounded by microteeth
Pronotal groove	Inverted V-shaped, dividing into 2 straight branches near the anterior end (Fig. 11)	Inverted Y-shaped, dividing into 2 weakly curved branches at about half its length	Inverted V- or Y-shaped, dividing into 2 weakly curved or straight branches near the anterior end	Inverted V-shaped, the branches straight, close to each other but not joined or scarcely joined at the anterior end
Metathorax	With a pair of poorly developed ambulatory pads ventrally	Without distinct ambulatory pads	With well defined ambulatory pads on both dorsal and ventral surfaces and connected by inner structures (Volkovitsh & Hawkeswood, 1987, Fig. 18)	Without distinct ambulatory pads
Body surfaces	Mainly glabrous with sparse setae and indistinct zones of micro-spinulae (Fig. 13)	Mainly glabrous with very sparse, indistinct setae	Mainly glabrous with sparse setae and indistinct zones of microspinulae	Totally covered with microspinulae

are as numerous as those between Anthaxiini and Melanophilini, but the true phylogenetic relationships cannot be defined on the basis of these observations when the adult morphology (especially antennal morphology) indicates that *Anilara* is more related to Anthaxiini rather than to Melanophilini or Kisanthobiini. Perhaps the larval characteristics are much more unstable than adult ones in that they are often adaptive in nature: It is also possible that the rate of evolution of larval characteristics is much greater than adult evolution. Therefore, it is necessary to utilize a combination of larval and adult characteristics from a large suite of species and genera before any accurate phylogenetic conclusions can be determined.

Concluding remarks

Our main analyses, which are outlined in Tables 2 and 3, show that the taxonomic position and relationships between *Anilara*, *Neocuris* and other Buprestidae are poorly understood, particularly their relationships with the taxa from the Northern Hemisphere. Holynski (1988) has recently placed *Anilara* and *Neocuris* in separate subtribes of the tribe Anthaxiini, but in our opinion, this placement is rather premature and possibly incorrect; we believe that both genera should be placed in a higher rank than subtribe (see for example the recommendations for *Neocuris* by Volkovitsh & Hawkeswood 1987). Further clarification of the relationships of these difficult groups must await the receipt and description of further larval material, especially of Australian species of *Anilara*, *Neocuris*, *Pseudanilara* and many others.

Acknowledgements

We would like to thank Dr J. F. Lawrence of Canberra, Australia for sending the *Anilara* material to the senior author under permit, and to Dr S. Bílý of Czechoslovakia and Dr C. L. Bellamy of the United States of America for reprints and other correspondence.

References

Bellamy, C. L. 1985. A catalogue of the higher taxa of the family Buprestidae (Coleoptera). - Navors Nat. Mus. (Bloemfontein) 4: 405-472

-- 1986. The higher classification of Australian Buprestidae, with the descriptions of a new genus and species (Coleoptera). - Aust. J. Zool. **34**: 583-600

Bílý, S. 1972. The larva of *Ptosima flavoguttata* (Illiger) (Coleoptera, Buprestidae). - Acta Ent. Bohemoslav. **69**: 18-22

-- 1986. Descriptions of adult larvae of *Thrincopyge alacris* Le Conte and *Aphanisticus conchinchinae seminulum* Obenberger (Coleoptera, Buprestidae). - Ent. Pap. Kurosawa, Tokyo: 198-204

Carter, H. J. 1926. Revision of the Australian species of *Anilara* (Fam. Buprestidae) and *Helmis* (Fam. Dryopidae), with notes, and descriptions of other Australian Coleoptera. - Proc. Linn. Soc. N.S.W. **51**: 50-71

-- 1929. A check list of the Australian Buprestidae (with tables and keys to subfamilies, tribes and genera, by Andre Thèry). - Aust. Zool. **5**: 265-304

Dumbleton, L. J. 1932. Early stages of New Zealand Buprestidae (Coleoptera). - Stylops **1**: 41-48

Hawkeswood, T. J. 1985. The larva of *Diadoxus erythrurus* (White) (Coleoptera: Buprestidae). - Aust. Ent. Mag. **12**: 23-28

-- 1988. A review of larval host records for twelve Australian Buprestidae (Coleoptera). - G. It. Ent. **4**: 81-88

-- & Peterson, M. 1982. A review of larval host records for Australian jewel beetles (Coleoptera: Buprestidae). - Vict. Nat. **99**: 240-251

Holynski, R. 1988. Remarks on the general classification of Buprestidae Leach as applied to Maoraxiina Hol. - Folia Entomol. Hung. **49**: 49-54

Levey, B. 1978. A taxonomic revision of the genus *Prospheres* (Coleoptera: Buprestidae). - Aust. Zool. **26**: 713-726

Volkovitsh, M. G. 1979. On the larval morphology of buprestid beetles of the genus *Acmaeoderella* Cobos (Coleoptera, Buprestidae). - Proc. Zool. Inst. Acad. Sci. USSR **83**: 21-38 (In Russian)

-- & Hawkeswood, T. J. 1987. The larva of *Neocuris gracilis* Macleay (Coleoptera: Buprestidae). - Zool. Anz. **219**: 274-282

-- & Hawkeswood, T. J. 1990. The larvae of *Agrilus australasiae* Laporte & Gory and *Ethon affine* Laporte & Gory (Insecta: Coleoptera: Buprestidae). - Spixiana **13**: 43-59.